Controlled delivery of biomacromolecular therapeutics from biocompatible polymer films

Project supervisors
Dr Cathy Holt, Manchester Medical School
Dr Andy Lewis, Biocompatibles Ltd
Professor Jian Lu, UMIST Biological Physics

Project duration
This is a two-year project to start from April 2004 (or as soon as possible thereafter), sponsored by BBSRC.

Project outline
Biomacromolecules such as oligonucleotides are of potential benefit in reducing in-stent restenosis if they could be delivered locally to the implant site. Many of these drugs are negatively charged and it is possible to control the loading and release via their interaction with positively charged polymers. This work aims to explore the routes and conditions for controlled loading and release for these therapeutic biomacromolecules from biocompatible polymer films, to assess the bioactivities of the drugs released and the behaviour of the modified surfaces to vascular cell growth. The project represents a true interdisciplinary collaboration with a view to treating in-stent restenosis.

An important part of the activities in the project is to perform cell assays to assess cytotoxicity and transfection. We envisage the use of smooth muscle cells and endothelial cells. Thus prior skills in cell culture and knowledge in basic cell biology are essential. As the project also involves handling of biocompatible polymer films and coatings, knowledge in polymeric biomaterials would also be beneficial but not essential. Training will be provided where needed during the project.

Progress management

The project will be based at UMIST Physics Department, with cell proliferation, viability or transfection assays to be carried out mainly in Dr Holt's laboratory at Manchester Medical School where the techniques to be used are in routine use. Dr Lewis will co-supervise cell assays on PC films so that the results from this work are directly comparable to other ongoing PC hydrogel studies. Quarterly meetings will be held to monitor project progress and discuss technical challenges and progress in the field of stent research. Drs Holt and Lewis will ensure that the activities to be defined in this project address issues relevant to pre-clinical experiments.

Laboratory infrastructure
The UMIST Biological Physics Group is well equipped for polymeric film processing and characterisation. It has dedicated physical and biological laboratories. The Group is has access to scanning probe microscopy (SEM and AFM), confocal microscopy and computing facilities The Cadiovascular Research Group led by Dr Cathy Holt has well established track record in the study of stent restonosis. Its laboratory is well equipped for vascular cell assays as already described previously. The two laboratories are within 0.5 mile of each other.

Application
We look for an enthusiastic and highly motivated individual with a strong interest in working between vascular biology and biophysics. Candidate should have a PhD degree in any branch of science and engineering, but preference will be given to those who have practical experience in cell culture. Knowledge in biomaterials research is desirable but not essential. The project can start at any time but preferably before May 15 2004. Enquiries and applications to: Prof. Jian Lu (j.lu@umist.ac.uk). Closing date for applications: 15th March 2004.